Only when the number of these unknown quantities is reduced to one, does it become possible for them to make use of the mathematical reasoning, involving the solution of functional equations, which has led in the hands of Tolman to such a wide variety of useful results. Since x is the ratio between their standards of length-measurement, and y that between their standards of time-measurement, they can express y in terms of x if they agree to make the same numerical report about any one kind of quantity which involves both length and time for its definition, that is, if they agree to make the same reports either about velocities or about accelerations. By making a corresponding second agreement about some quantity which involves for its definition force *and* time *or* length *or both*, such for instance as charge or mass or energy, they will be able to express z in terms of x—and to derive an entire set of transformation equations which involve only one unknown quantity. With this new set of equations at hand, they may undertake to set up functional expressions and to derive laws as Tolman has done.

Evidently the number of the different possible sets of transformation equations is quite considerable, for there are many measurable quantities in physics which involve for their definition more than one of the three fundamental undefined quantities. I have calculated nine such different sets. Several of them lead to *some* of the conclusions which may be deduced from the equations of O and O' above (based upon agreements concerning velocities and charges); several of them lead, in cases where the set of O and O' has proved fertile, to insoluble or absurd functional equations which point to no solution. Some of them lead to laws which are contrary to those whose validity has been established by experiment. None of the sets is as fertile or leads to as many well established laws as the set which is based upon the agreement of O and O' to report all charges and all velocities by the same numerical value. But this agreement is the only thing in the way of an *assumption* which is involved in the simplified form of Tolman's principle of similitude that is developed by O and O' of this paper. The noteworthy success of Tolman in deriving from his principle a large number of experimentally valid laws is evidence that an agreement between observers working with different standards of measurement to report the same charges and velocities by the same number is somehow more intimately in harmony with the order of nature than any other similar agreement relative to some other of the quantities of physics.

Electrical charges may be regarded as if they are made up of a countable number of small units. This has been adequately demonstrated by the researches of Millikan and others in which electrons have actually been isolated and counted. But it could also have been predicted—for, as an assumption, it leads in the hands of O and O' to many conclusions which are otherwise verified by experimental fact. In the same way the assumption that velocities are of such sort that there is only one right way to report their magnitude, is one which leads, vastly better than any similar assumption, to the deduction of laws which are established in fact. Hence the assumption is probably true.

Professor Tolman has kindly read the first draft of this paper. He suggests that the conclusion that velocity is of such nature that there is only one right way to report its magnitude, a conclusion which has here been reached by abstract reasoning, may be interpreted concretely to mean that "any given velocity is most sensibly regarded as a given fraction of the maximum possible velocity, namely that of light."

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JACQUES DANNE

WITH the outbreak of the world conflict in 1914 *Le Radium* at once ceased publication, all of its editors being called into service. The decision for service was no less definite than the assurance that publication would be

resumed with the coming of peace. Little did any one think that the renewal of publication would be in the hands of other than Jacques Danne. Indeed, the war being finally over Danne himself was busy with the preparation of the first new number when a sudden and rapid illness culminated in his death on March 8, leaving the science of radio-activity and electronics sadly weakened.

Jacques Danne was born in Paris in 1882. After excellent schooling he entered the Ecole de Physique et Chemie de Paris in 1897, where he distinguished himself as the first in a remarkable class of scientific students. He was invited by Curie to become his assistant in 1902, and at once added the power of his knowledge to Curie's work. Curie, working entirely as a physicist, had met innumerable problems which were leading up to the disintegration theory. The chaotic condition of the science of radioactivity in the years 1898–1902 was due chiefly to the fact that it was carried on by physicists without aid of chemical methods. These latter Soddy supplied in Montreal and Danne in Paris, and within a year the fact of atomic disintegration was established, and radio-activity became a science.

In 1904 M. Danne founded *Le Radium,* the first number of which appeared on July 15. He gathered about him an impressive "scientific committee" to insure an adequate treatment of all phases of the sciences of radioactivity and electronics, radiation and ionization; in short, of subatomic phenomena. For ten years he gave the greater part of his time to this journal, and in 1914 it was the sole representative of this very vital field of knowledge.

Six numbers of Volume 11 appeared in 1914, and now Number 7, Volume 11, appears in May, 1919, under the direction of Gaston Danne, the younger brother of Jacques, who for many years has been the chief spirit in the admirable Laboratoire d'Essais des Substances Radioactives, which Danne established at Gif in the Vallée de la Chevreuse.

The loss of Jacques Danne is irreparable, but under the direction of M. Gaston Danne *Le Radium* will continue admirably to serve the new science of subatomic phenomena. At the request of M. Danne I am receiving papers and subscriptions at this address.

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SCIENTIFIC EVENTS

EXPEDITIONS FROM THE UNIVERSITY OF CALIFORNIA

JUST returning from a four month's expedition through southeastern Alaska and northern British Columbia, a party of scientific men under the leadership of Dr. Joseph Grinnell from the University of California has brought about 1,200 specimens of birds and mammals representing nearly all of the birds and smaller species of mammals inhabiting the country, as well as a few examples of the larger mammals, such as mountain goat, grizzly bear, wolf and beaver. Some amphibians, plants, and a large number of photographs also were brought back.

H. S. Swarth, curator of birds, and Joseph Dixon, economic mammalogist, assisted at times by local guides and hunters, comprised a party which started from Wrangell, Alaska, and went to Telegraph Creek, British Columbia, a distance of 170 miles from the coast and at the head of navigation on the Stikine River, traveling by the river boat which runs on the stream during the five months of the year when it is free of ice. On the return trip down stream camps were established at various points and explorations were pursued.

Reports from the party indicate that the coast of southeastern Alaska is characterized by extremely heavy rainfall while the interior toward the source of the Stikine River is relatively arid.

The country about the upper Stikine River for a long time has been a mecca for big game hunters, this region being one of the few remaining places in North America where a variety of such game may be pursued with a fair assurance of success. But this year's expedition of the Museum of Vertebrate Zoology of the University of California is said to be the first party of naturalists to visit and care-